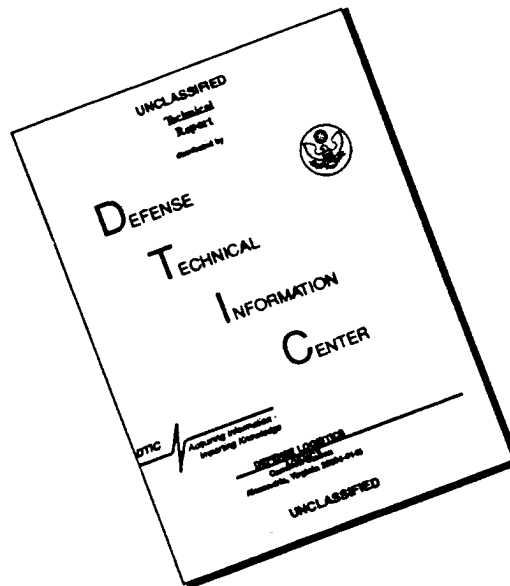


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**WL-TR-96-5002**



# **THIRTY-FIVE YEARS OF ACQUISITION EXCELLENCE**

**AUGUST 1996**

**FINAL REPORT FOR 01/1/95 -- 12/01/95**

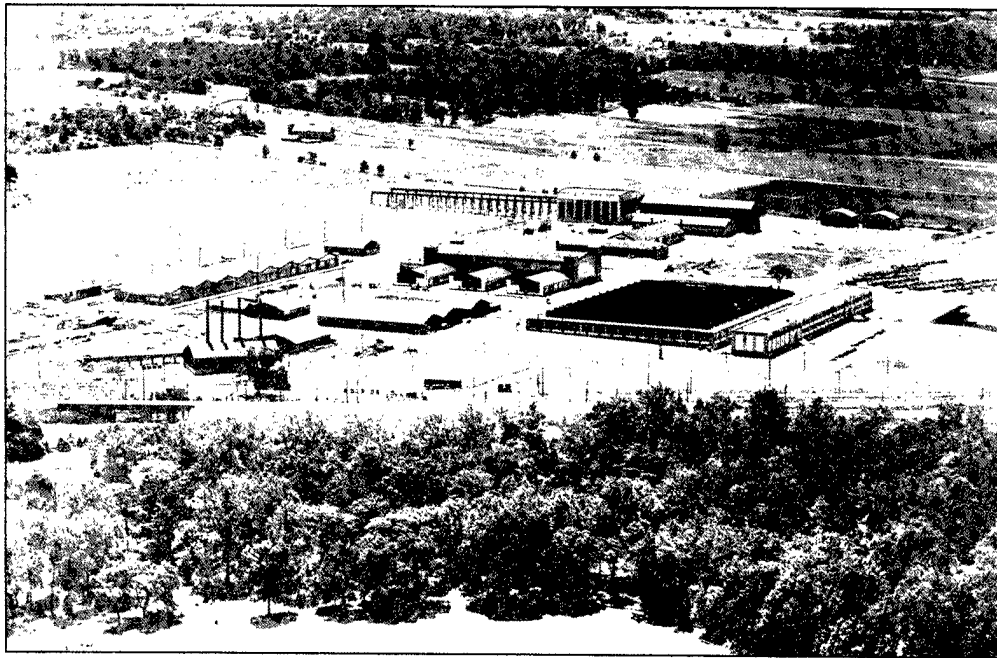
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**HISTORY OFFICE  
AIR FORCE SYSTEMS COMMAND  
WRIGHT-PATTERSON AIR FORCE BASE, OH 45433-7126**

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
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13. ABSTRACT (Maximum 200 words)  For 35 years, the Aeronautical Systems Center (ASC) has served as the nation's premier organization of military aeronautics. ASC's mission encompasses all stages in the research, development, and acquisition of aircraft and their related equipment and technologies. Headquartered at historic Wright Field (Area B, Wright-Patterson AFB, Ohio, ASC owns one of the largest scientific and engineering establishments in the world, including the Wright Laboratory with its associated facilities and personnel -- the largest of the Air Force's "super labs." Since 1992, ASC's mission has also expanded to include the 88th Air Base Wing, which operates Wright-Patterson from it's headquarters in Area C, and the 74th Medical Group, which operates the USAF Medical Center in Area A, one of the largest military medical facilities in the nation.				
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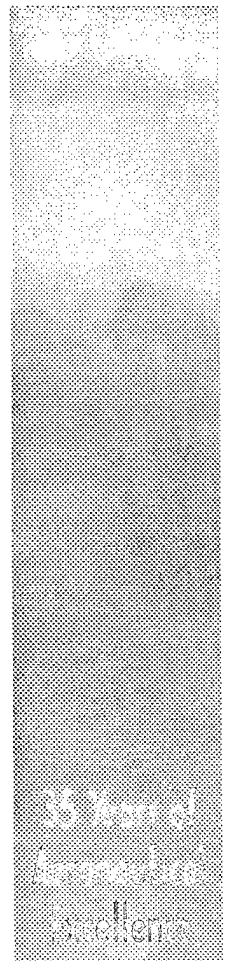
For the past 35 years, the Aeronautical Systems Center (ASC) has served as the nation's premier organization for military aeronautics. ASC's mission encompasses all stages in the research, development, and acquisition of aircraft and their related equipment and technologies. Headquartered at historic Wright Field (Area B, Wright-Patterson AFB, Ohio), ASC owns one of the largest scientific and engineering establishments in the world, including the Wright Laboratory with its associated facilities and personnel—the largest of the Air Force's "super labs." Since 1992, ASC's mission has also expanded to include the 88th Air Base Wing, which operates Wright-Patterson from its headquarters in Area C, and the 74th Medical Group, which operates the USAF Medical Center in Area A, one of the largest military medical facilities in the nation.



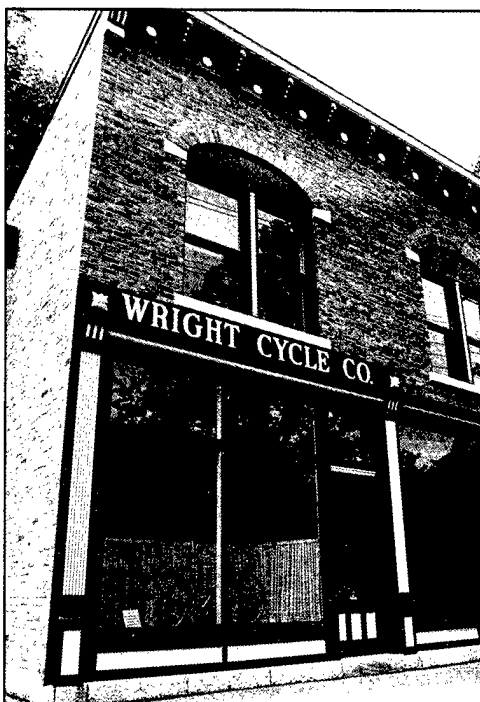
*Aerial view of  
Wright Field, 1928*



*Aerial view of  
Wright Field, 1982*



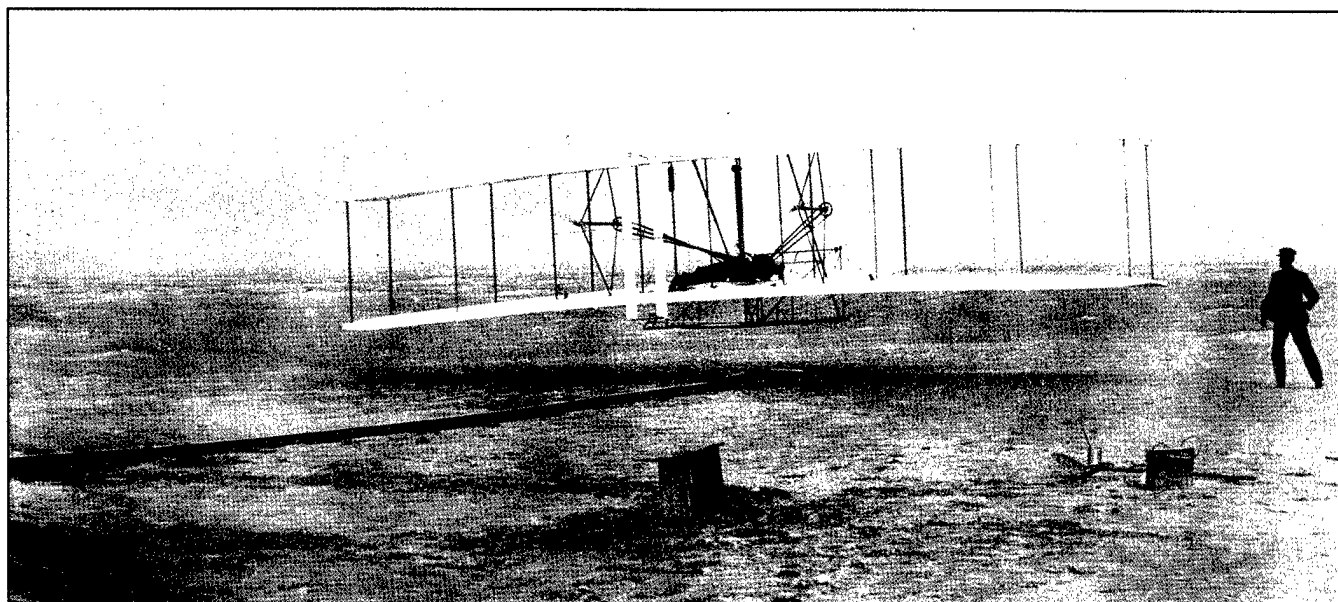
**A**lthough ASC celebrates its thirty-fifth anniversary in 1996, its roots go back much farther in fact, to the very origins of military aeronautics . . . to a small bicycle shop in Dayton, Ohio . . . to a President of the United States who wanted to get places in a hurry . . . and to a generation of courageous young Americans who first dared to "slip the surly bonds of earth."



*Replica of Wright Cycle Co., on display at Carillon Park, Dayton*



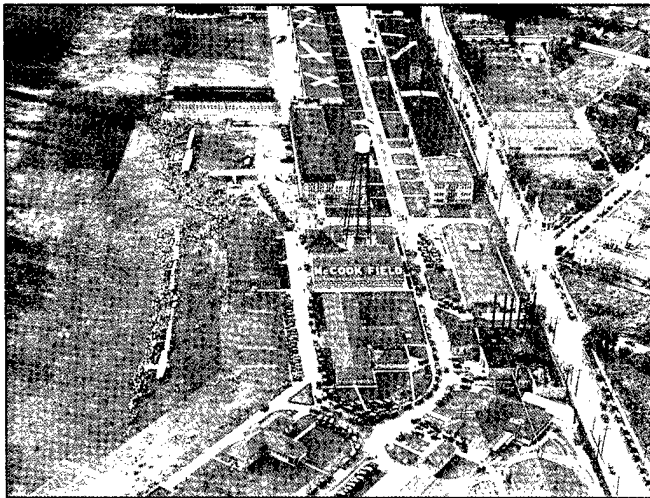
*Orville and Wilbur Wright*



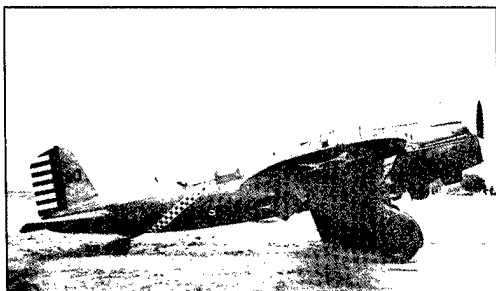
*The Wright brothers' first flight at Kitty Hawk, NC, 17 December 1903*

## ORGANIZATIONAL LINEAGE

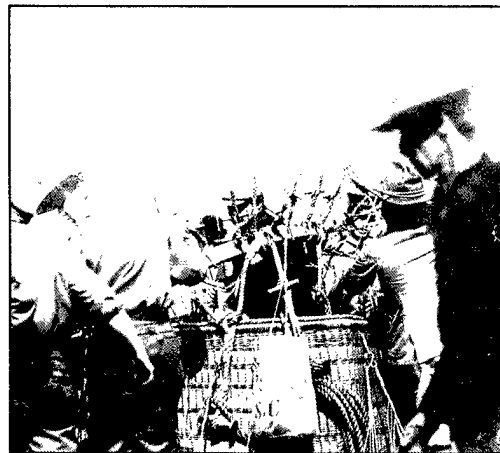
**A** SC traces its origins to 1907 when the U.S. Army Signal Corps established an Aeronautical Division at the request of President Theodore Roosevelt. In 1908 the Division sponsored the flight trials of the Wright Flyer at Ft Myer, Virginia, and in the following decade defined the first military aircraft requirements and specifications. When the U.S. entered World War I in 1917, the Army established McCook Field in Dayton, Ohio. McCook combined experimental and production engineering of aircraft to ensure that the Army's Air Service procured reliable and effective aircraft and associated equipment. In 1927, McCook's engineering and procurement staffs moved across town to the newly opened Wright Field, where they formed the Materiel Division. During the 1930s, the Materiel Division, despite tight budgets and little political support, fostered a revolution in aircraft development that saw cloth and wood biplanes give way to all-metal monoplane aircraft with enclosed cockpits and cabins.



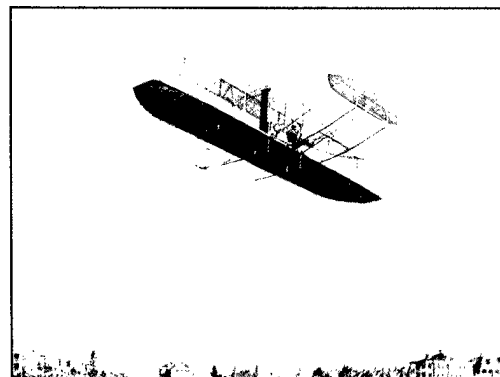
*Aerial circus at McCook Field, 4 July 1923*



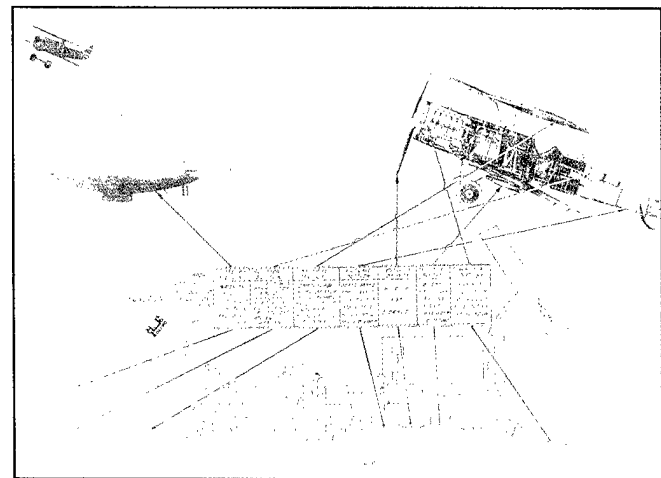
*The Curtiss A-8 Shrike was the first all-metal attack bomber.*



*Before purchasing the Flyer, the Signal Corps utilized balloons.*



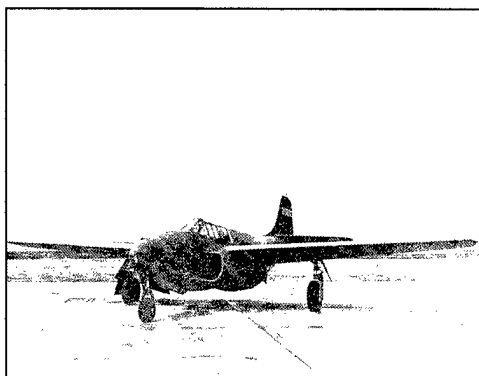
*Orville in Wright Flyer at flight trials at Fort Myer, VA.*



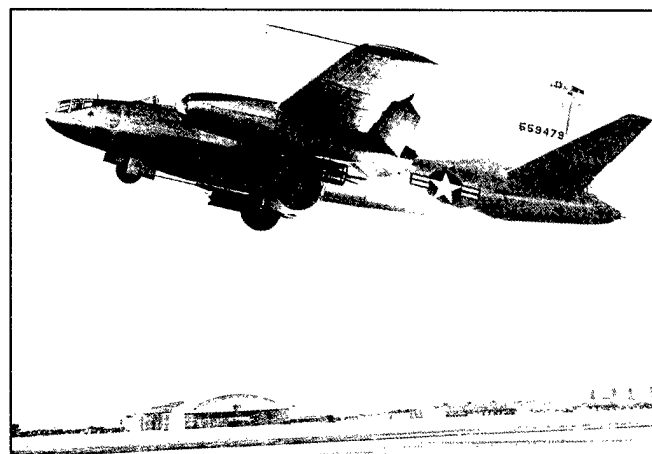
*Layout of McCook Field, 1923*

35 Years of  
Aeronautical  
Excellence

During World War II the Materiel Division became first the Materiel Command, then the Air Technical Service Command, and in the early postwar period the Air Materiel Command (AMC). In 1951 the Department of the Air Force (est. 1947) separated AMC's Directorate of Research and Development to form a new command for R&D, the Air Research and Development Command (ARDC). At Wright-Patterson, ARDC's field unit was the Wright Air Development Center (WADC). In 1959, WADC was reorganized and redesignated the Wright Air Development Division (WADD). During the 1950s, WADC's and then WADD's laboratories and weapon system development offices worked closely with AMC's procurement staff to reengineer and reequip the Air Force for the jet and missile age.

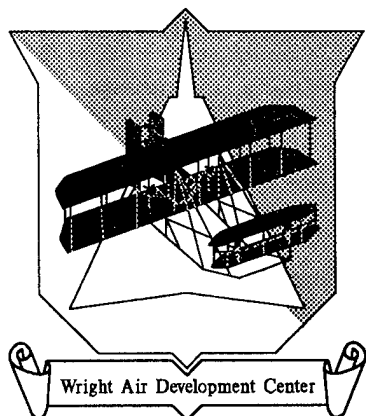


*The Bell XP-59A Airacomet was the Army Air Forces' first jet, flown in 1942.*



*The North American XB-45 Tornado became the first U.S. operational jet bomber.*

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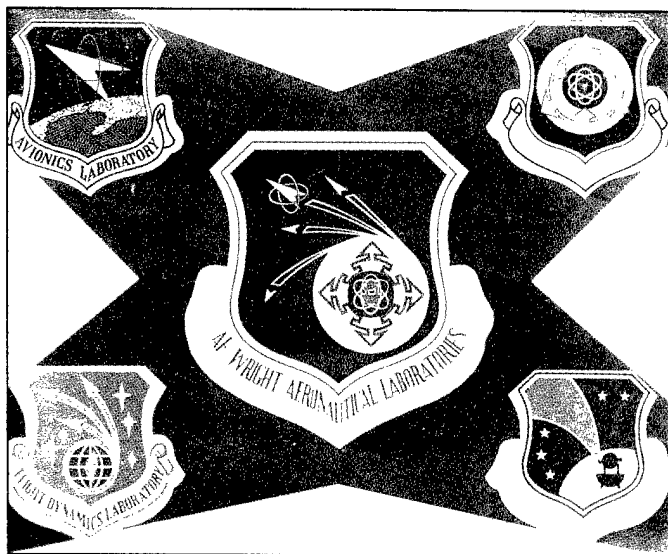
*The Martin TM-61 Matador became the Air Force's first operational missile in 1951.*



In 1961, the Air Force decided to reunite its procurement and engineering staffs in one organization and created the Air Force Systems Command (AFSC). At Wright-Patterson, AFSC's field unit was the Aeronautical Systems Division (ASD), established on 1 April. ASD combined the procurement responsibilities of AMC's Aeronautical Systems Center and the Wright Air Development Division (WADD). In 1963, AFSC placed ASD's engineering directorate and its four laboratories for Materials, Aero Propulsion, Avionics, and Flight Dynamics under a Research and Technology Division (RTD). In 1967 RTD was disestablished, with systems engineering returning to ASD while the four laboratories were placed under AFSC's Director of Laboratories. In 1975, the laboratories were placed under a new organization at Wright Field, the Air Force Wright Aeronautical Laboratories (AFWAL). In 1982, AFWAL was merged with ASD, thereby uniting for the first time since the early 1960s the system program offices (SPOs) and the laboratories in one organization. In 1988 AFWAL was reorganized and redesignated the Wright Research and Development Center (WRDC) and in 1990, the Wright Laboratory (WL).

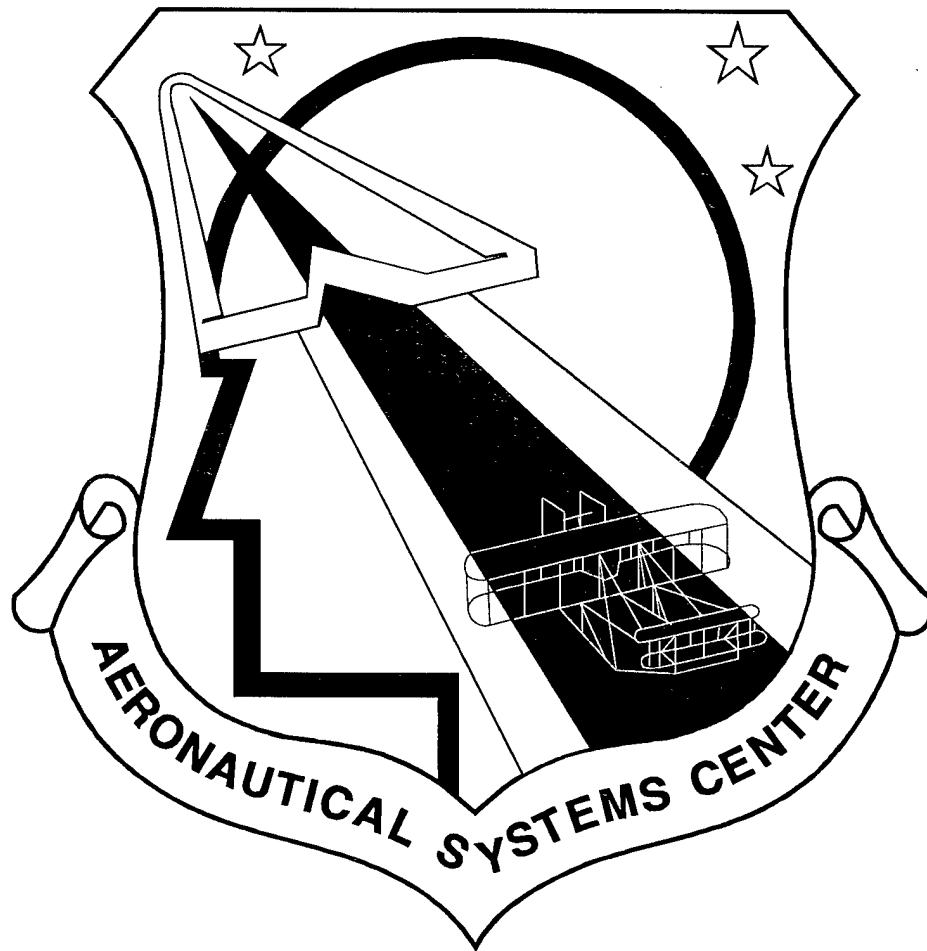


*Aeronautical Systems Division was established on 1 April 1961.*



*The four laboratories at Wright Field were placed under AFWAL in 1975.*

The early 1990s was a period of intense reorganization and consolidation within the Air Force as a result of the end of the Cold War. The Air Force disestablished the Strategic Air Command and the Tactical Air Command and created the Air Combat Command. Likewise, it disestablished AFSC and the Air Force Logistics Command to create the Air Force Materiel Command (AFMC), on 1 July 1992. With the creation of AFMC, ASD simultaneously was reorganized and redesignated the Aeronautical Systems Center (ASC).



## THE BICYCLE SHOP

Whatever its designation over the years, the scientific and engineering community at Wright Field has hearkened back to the bicycle shop on West Third Street, Dayton, Ohio, where Wilbur and Orville Wright invented the world's first successful airplane and, in the process, the discipline of aeronautical engineering. In 1917 when McCook Field's first recruits stepped off the train in Dayton from points all over the United States, little could the nation or the world know how momentous an occasion this was. The Wright brothers had made Dayton the "birthplace of aviation." The scientists and engineers of McCook and Wright Fields were to make Dayton the nation's premier center for military aeronautics.



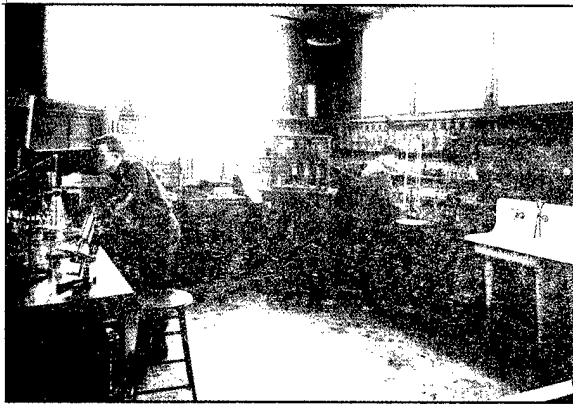
*Working in their bicycle shop, the Wright brothers developed the first successful airplane.*

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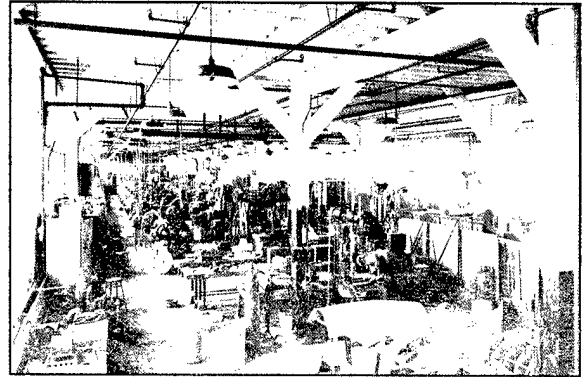


*Flight Test Section at McCook Field, 1926 (those pictured include James H. Doolittle, fourth from left, and John A. Macready, sixth from left).*

During the 1920s the McCook engineering establishment laid the foundation for the remarkable success of subsequent decades. This consisted of a close working relationship with the airplane industry, the National Advisory Committee for Aeronautics (NACA), the National Bureau of Standards, and academic research laboratories. In-house, the Air Service (from 1926 the Air Corps) maintained a small but dedicated laboratory establishment for "experimental engineering," which included everything from basic and applied research through engineering development. Special emphasis was given to the rigorous ground and flight testing of industry-designed and fabricated prototype aircraft and engines. With the move to Wright Field, in 1927, the Air Corps' Materiel Division owned one of the most advanced aeronautical technical facilities in the world.



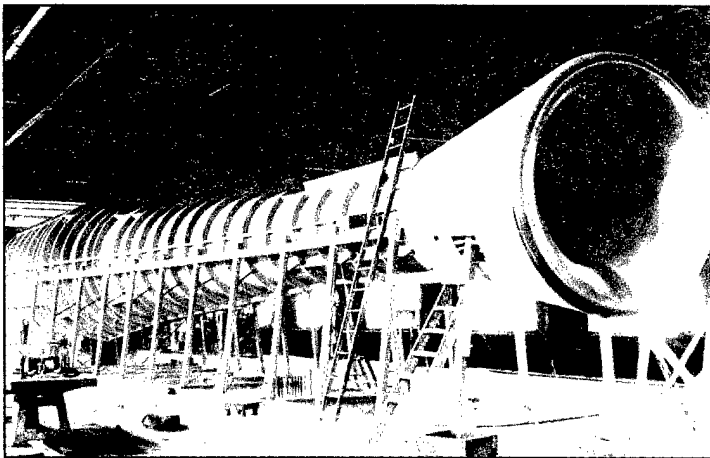
*Chemical Laboratory at McCook Field, 1918*



*Machine shops at McCook Field, 1918*



*Fuselage assembly at McCook Field, 1921*



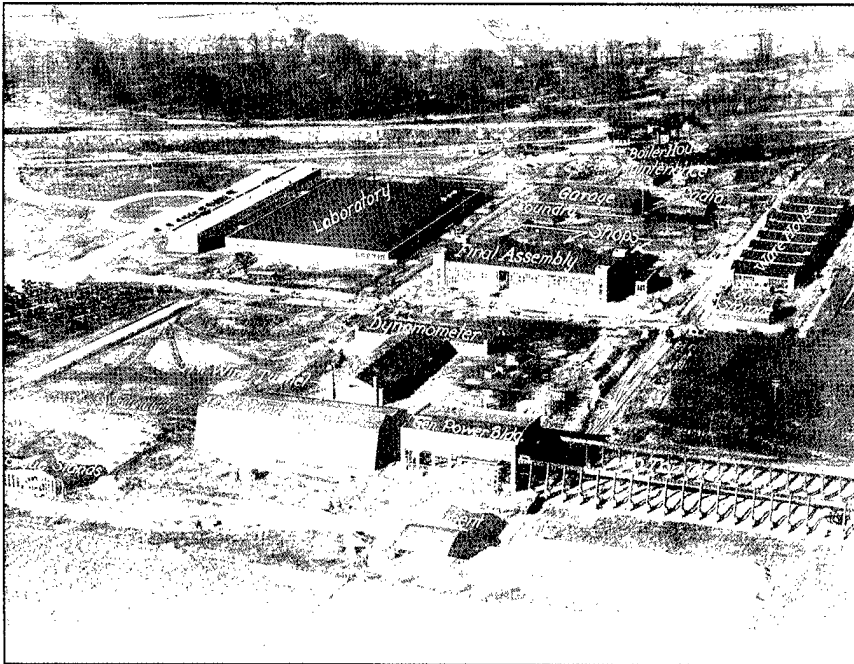
*New construction at Wright Field during 1927-1928*



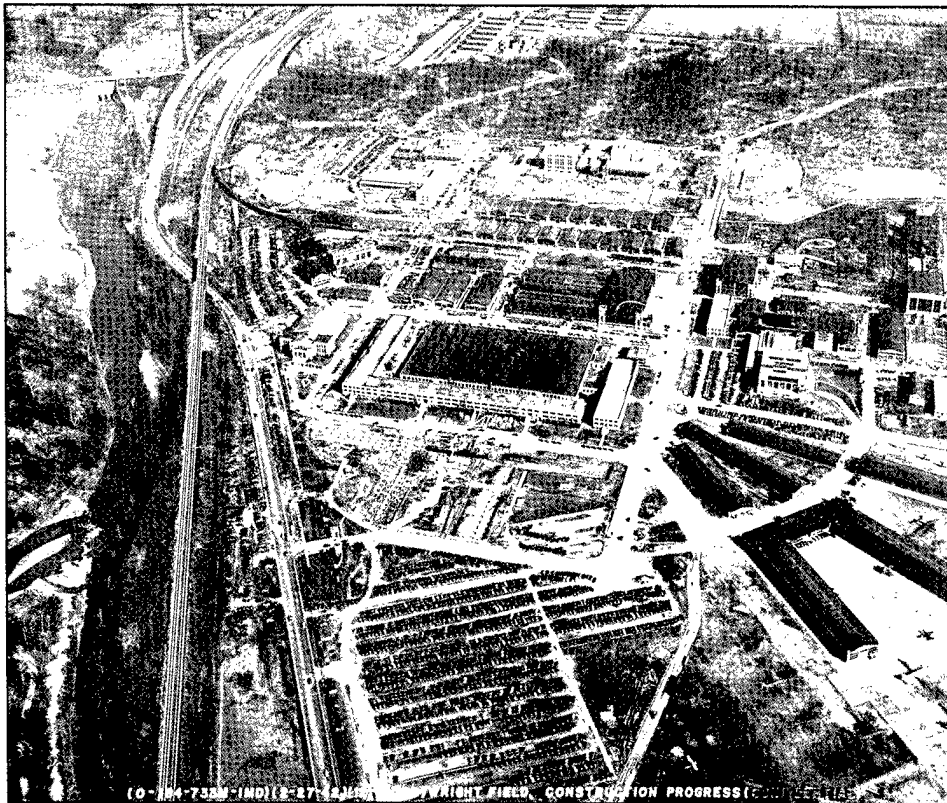
*Aircraft Branch at Wright Field, 1932*

Wright Field grew modestly during the 1930s to accommodate the development of such aircraft as the B-17 and the B-25. World War II completely changed Wright Field. The size of the physical plant and the engineering and procurement staffs grew dramatically and the Air Corps' (from 1941 the Army Air Forces') way of doing business underwent fundamental change. Before the end of the war, Wright Field saw the establishment of the first large project office

for procuring a single aircraft, the B-29. Here lay the origins of the later system program office (SPO).



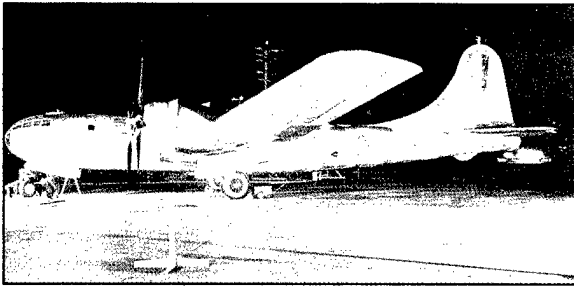
Wright Field, 1928



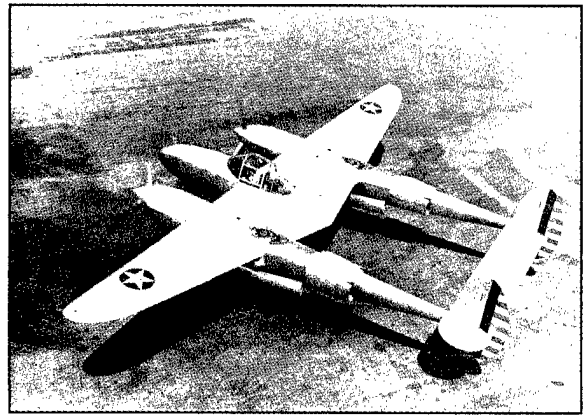
The Materiel Center at Wright Field expanded to meet accelerated wartime requirements.

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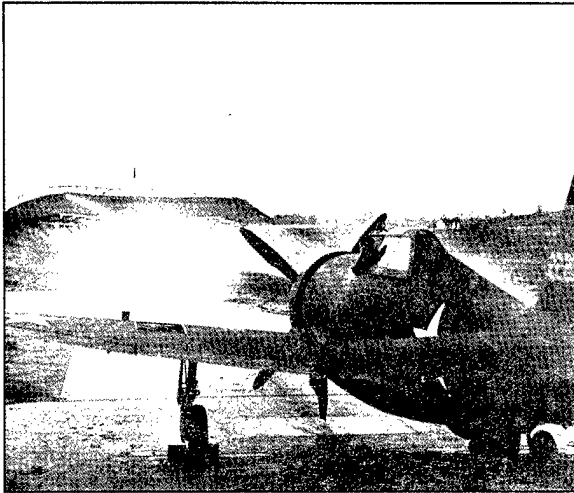
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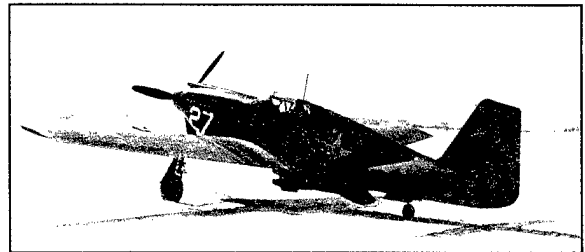
*Boeing XB-29, later named the Superfortress*



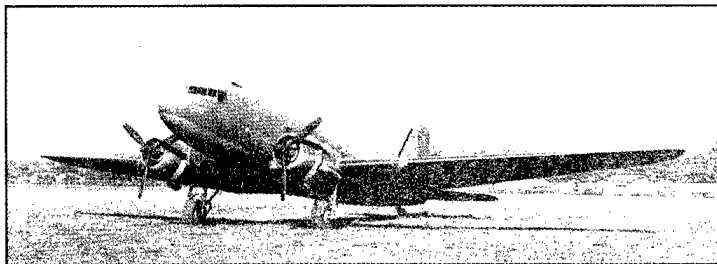
*Lockheed P-38 Lightning*



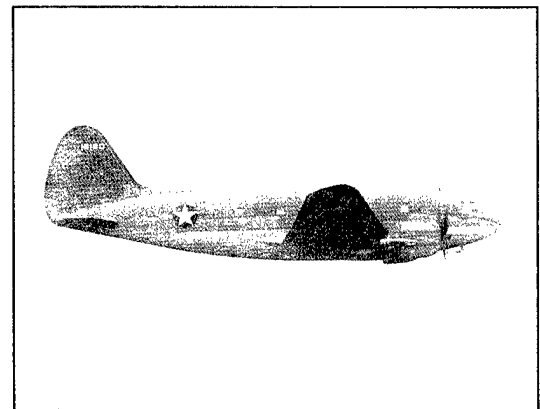
*Republic P-47 Thunderbolt*



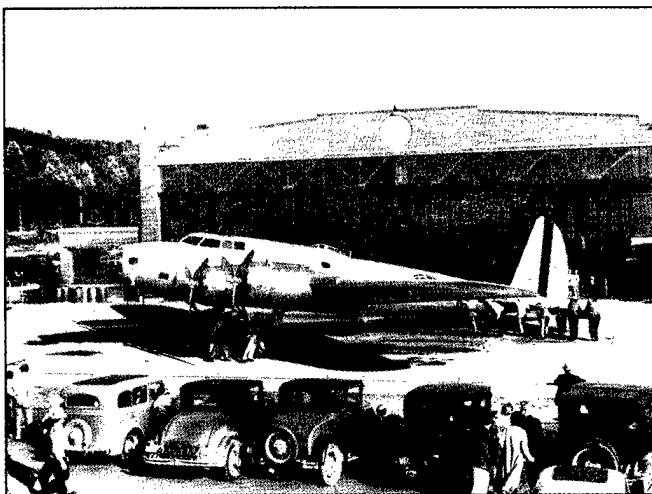
*North American XP-51A Mustang*



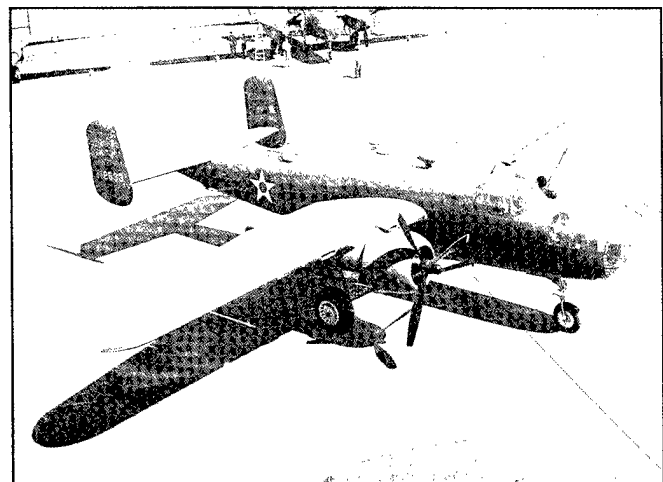
*Douglas C-47 Skytrain*



*Curtiss C-46 Commando*



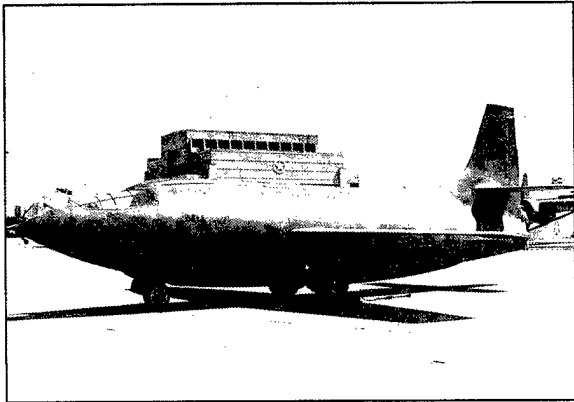
*XB-17 (Model 299) at Boeing plant*



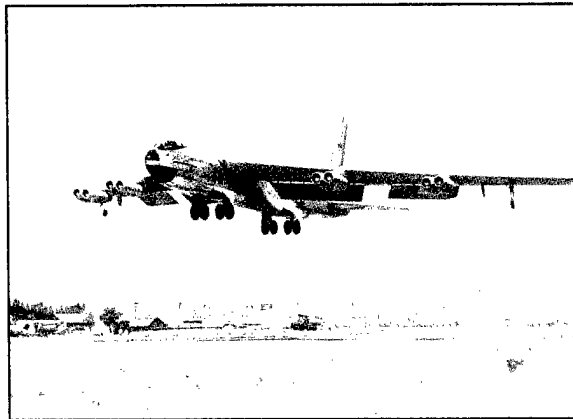
*North American B-25 Mitchell*



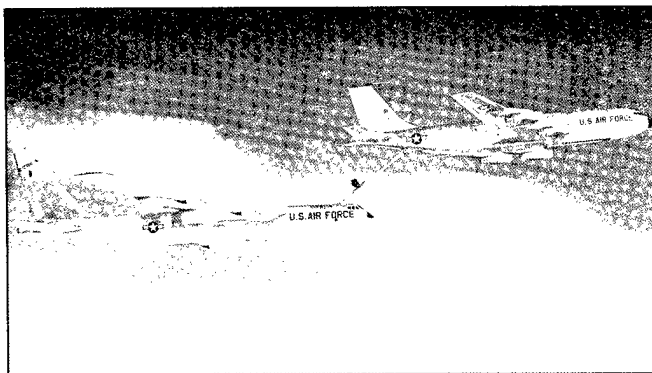
During the 1950s, Wright Field witnessed the organization of weapon systems project offices (WSPOs), to coordinate WADC's R&D work with AMC's procurement responsibilities. Under this arrangement the decade saw the Air Force develop and acquire its first large jet bombers, like the B-52; jet tankers, like the KC-135; and first supersonic jet fighters in the "century series." Before the end of the decade, WADC had also developed the first supersonic bomber, the B-58, and was planning the development of Mach 3 fighters and bombers, advanced reconnaissance aircraft, and space vehicles, including manned capsules for ballistic delivery into space and hypersonic winged lifting bodies, like the X-20 Dyna Soar.



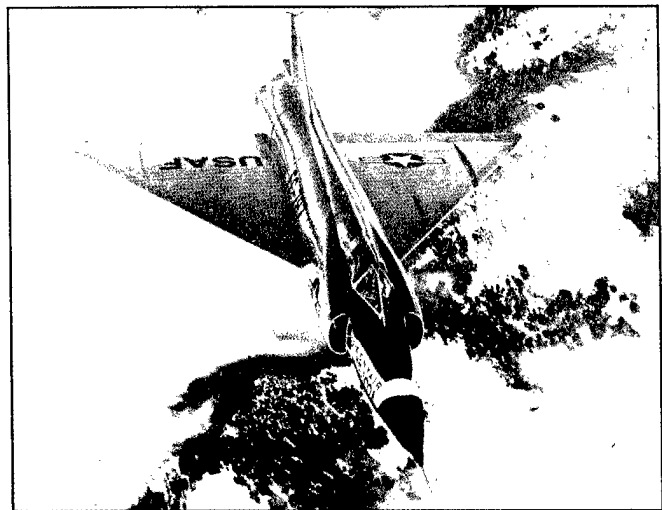
*Bell XS-1 transonic flight research vehicle*



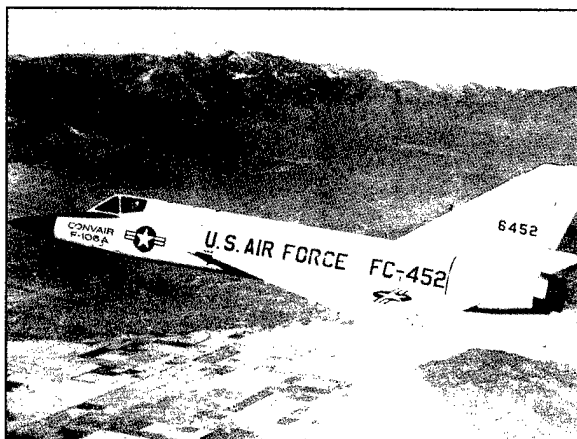
*First flight of the Boeing YB-52 Stratofortress in 1952*



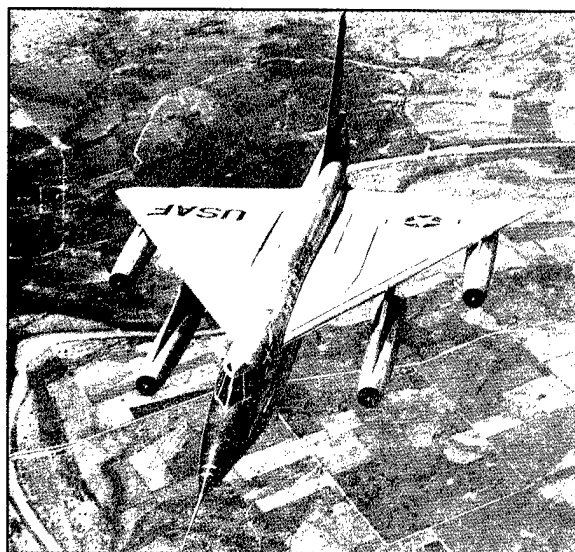
*Boeing KC-135 Stratotanker*



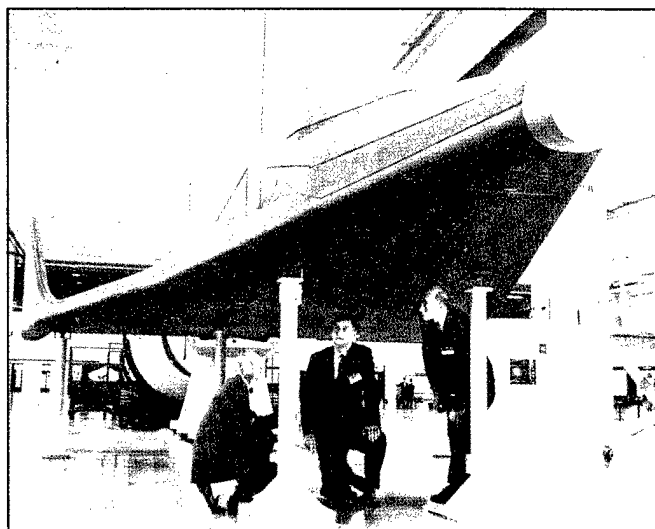
*Convair YF-102A Delta Dagger*



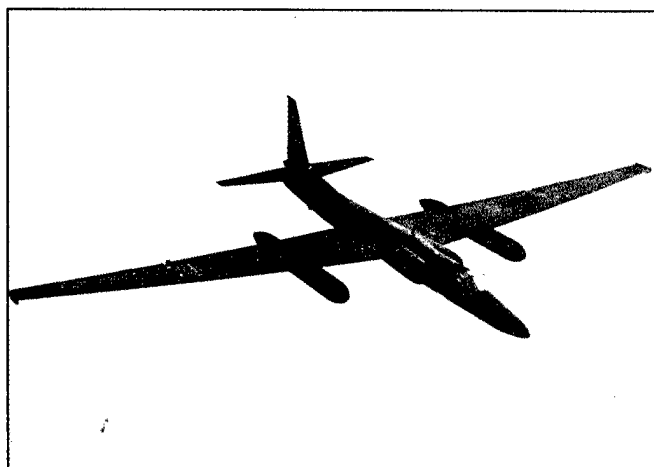
*Convair F-106A Delta Dart*



*Convair B-58 Hustler*



*Mock-up of the Boeing X-20 Dyna-Soar.*



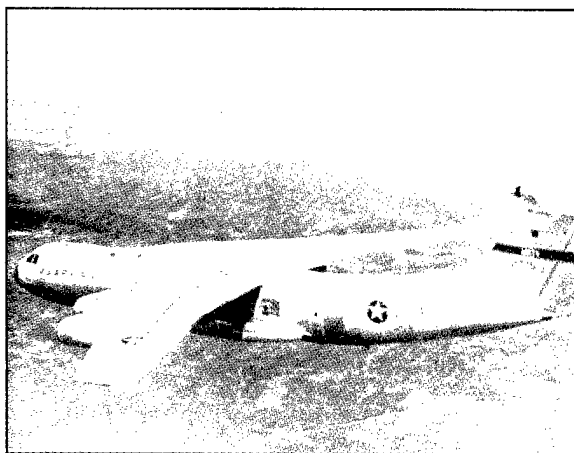
*The TR-1A tactical reconnaissance aircraft, a derivative of the Lockheed U-2R, incorporated advanced electronics and radar.*



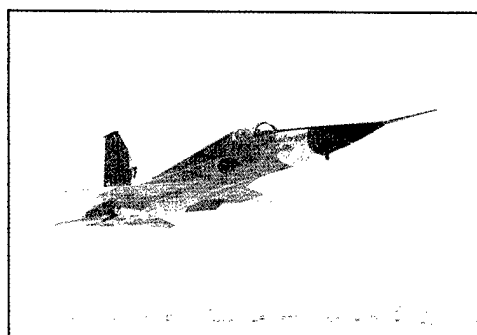
In the 1960s the new Aeronautical Systems Division (ASD) and the Wright Field laboratories began laying the foundation for today's Air Force. The decade saw the development and acquisition of the Air Force's first large jet airlift aircraft, the C-141, and the giant, wide-body C-5A. ASD also improved on the first generation of jet fighters, developed in the 1950s. These improvements included upgrades to the Navy F-4 as well as the development of all-new Air Force fighters, including the F-5, the F-15, and the F-16. The latter two aircraft became the foundation of the Air Force's modern tactical air arm. Meanwhile, ASD incorporated revolutionary "swing-wing" technology, developed during the 1950s with the X-5, into the F-111 fighter-bomber and design plans for a new strategic bomber, which later became the B-1. Despite the cancellation of the Mach 3 B-70 bomber, ASD forged ahead into the high-speed regime with development of the YF-12A, which operationally served the Air Force as the SR-71 reconnaissance aircraft—the world's fastest airplane.



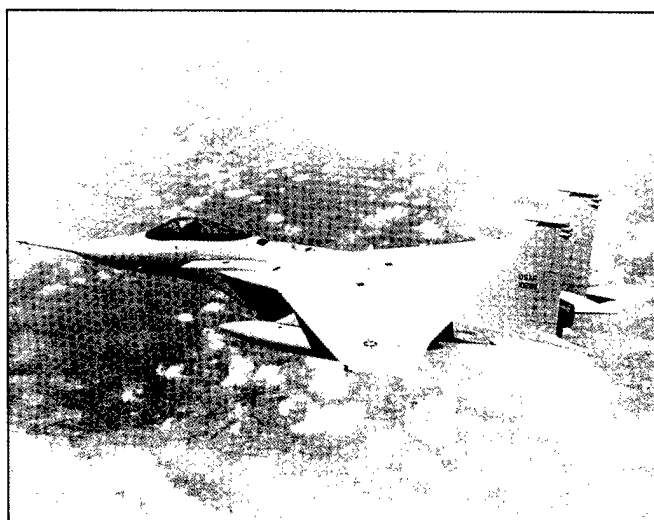
*Lockheed C-5A Galaxy heavy strategic transport*



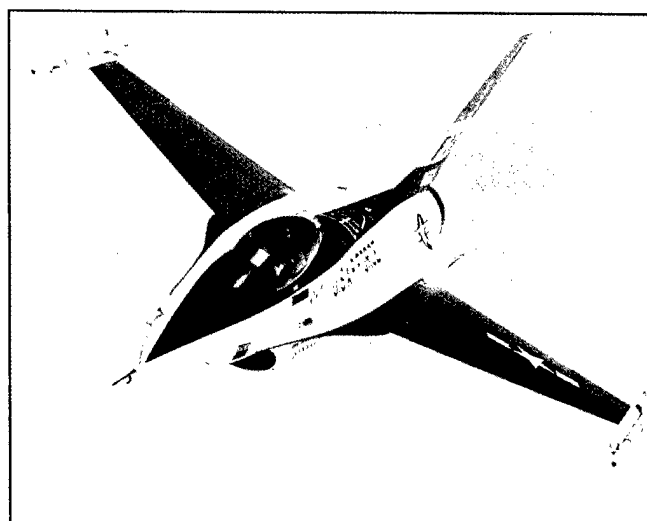
*Lockheed C-141 Starlifter fanjet strategic transport*



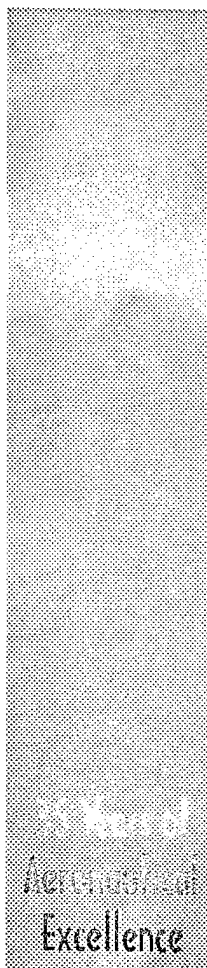
*Northrop F-5 Freedom Fighter*

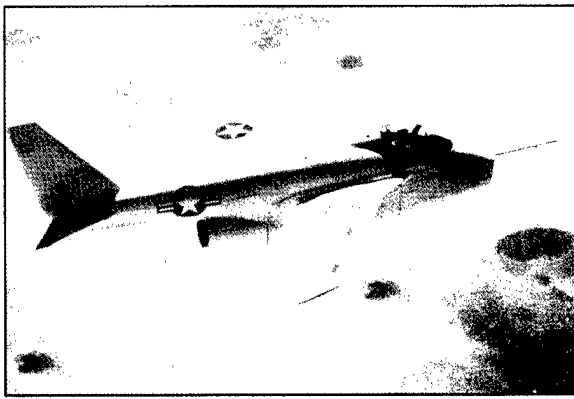


*McDonnell Douglas F-15 Eagle*

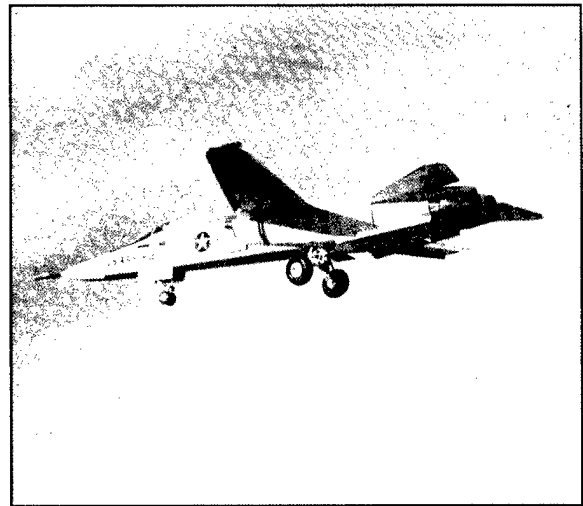


*General Dynamics YF-16 , later named the Fighting Falcon*

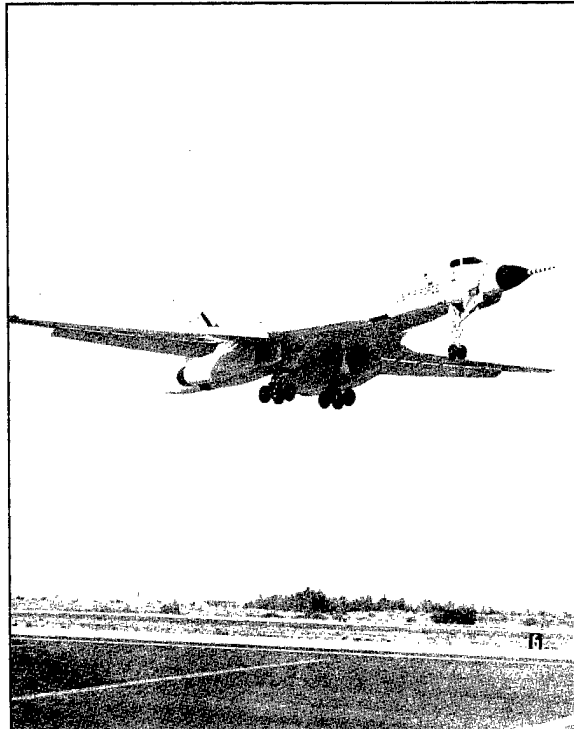




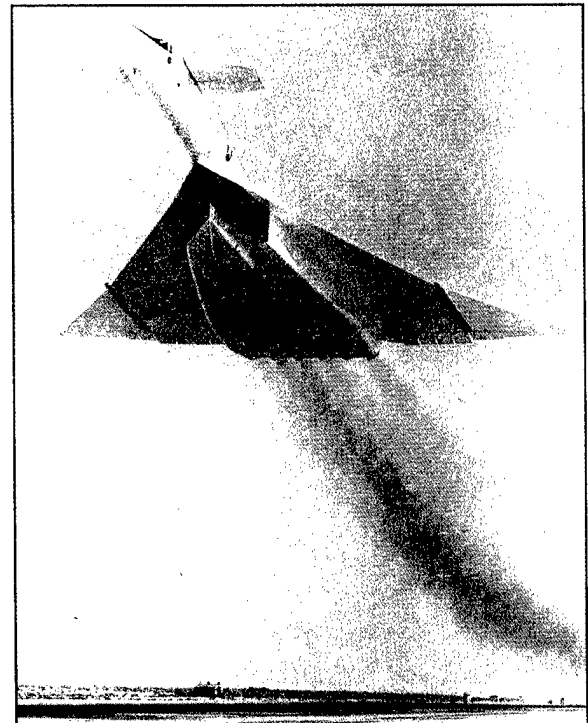
*The Bell X-5 incorporated in-flight variable-sweep capability.*



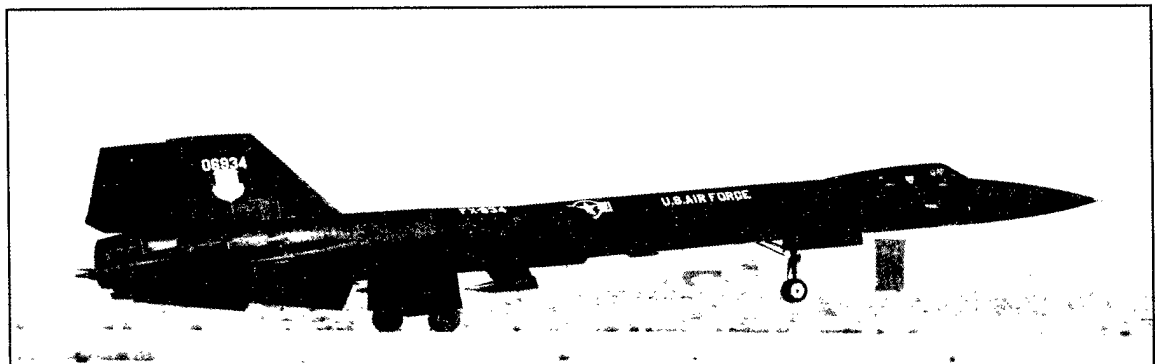
*First flight of the General Dynamics F-111A*



*Rockwell B-1A strategic bomber*

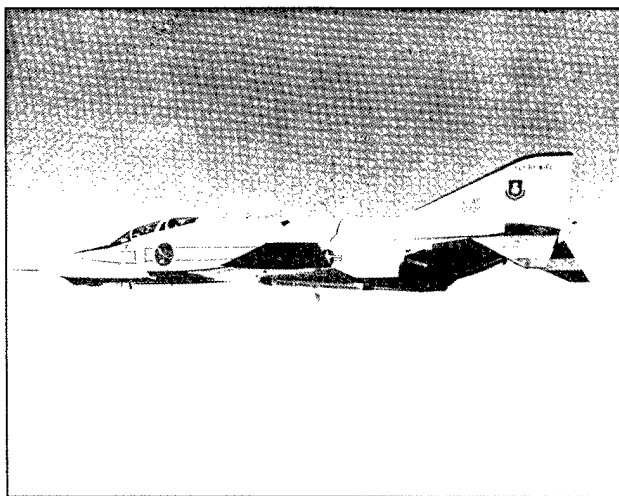


*North American XB-70 Valkyrie Mach 3 strategic bomber*

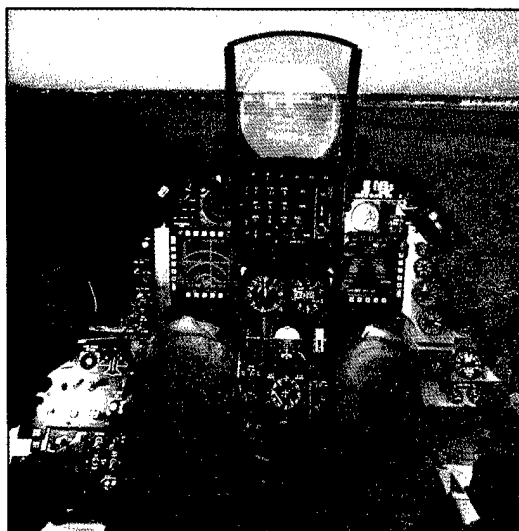


*The Lockheed YF-12 interceptor was the predecessor of the SR-71 Blackbird.*

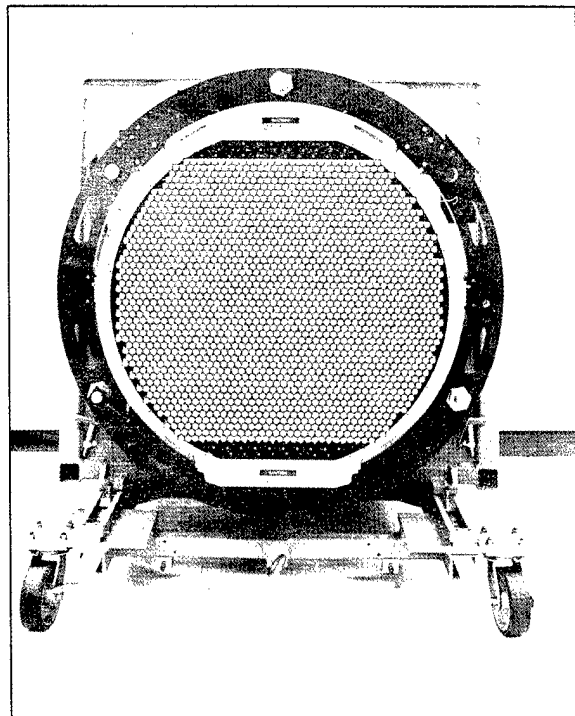
These developments were made possible due to the advanced technology developed and underwritten by the Wright Field laboratories in the 1950s and 1960s. Among the most significant advances fostered by the laboratories at this period were fly-by-wire technology that revolutionized aircraft control, reliability, and safety; the first airborne phased array radars that promised order of magnitude improvements in performance and reliability; advanced composites, high temperature alloys, and semiconductor materials; and the high-bypass turbofan engine that made possible a new generation of wide-body airlift aircraft, including the C-5 and large commercial airliners.



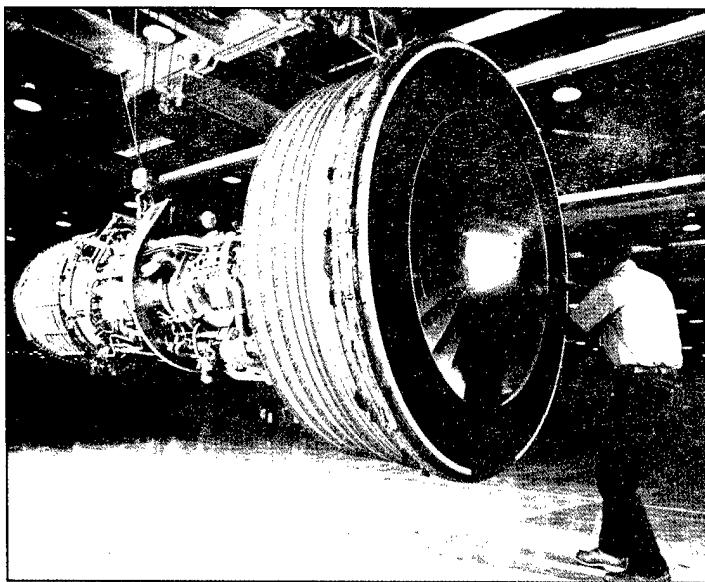
*Fly-by-wire technology was tested on the F-4D.*



*The F-16 incorporated fly-by-wire, or computerized technology.*



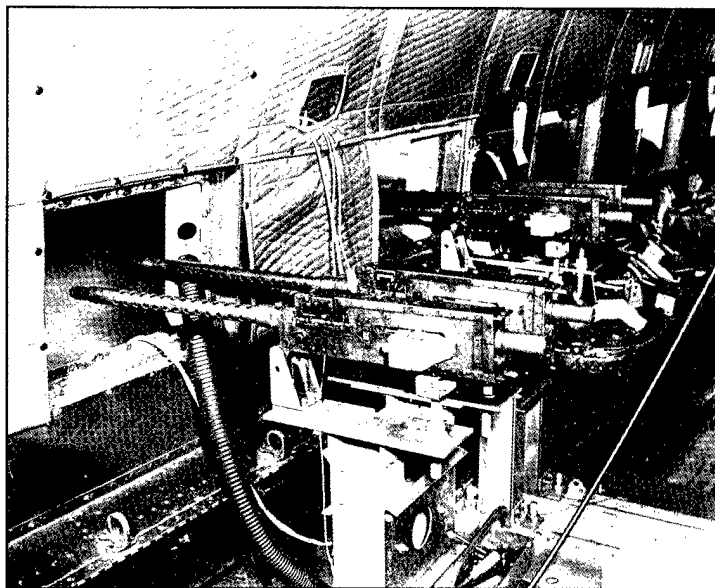
*Phased array radar*



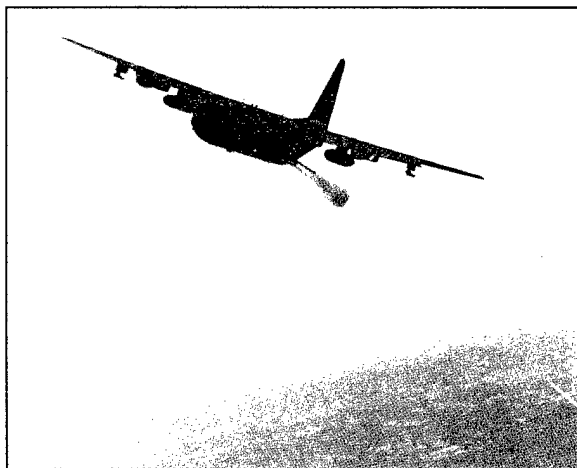
*The TF-39, installed on the C-5A, was the first high-bypass turbofan engine.*

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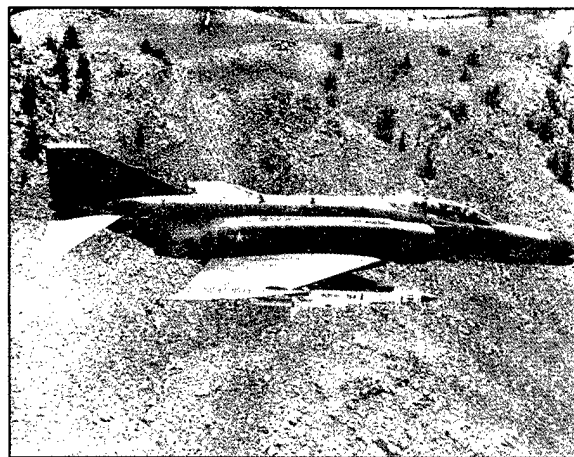
From the mid 1960s ASD and the laboratories increasingly turned to support the U.S. effort in Vietnam. This support included a number of programs, some of which improvised brilliantly on current technology to create all-new weapon systems. Among these new systems were the gunship (AC-47, AC-119, and AC-130), the Wild Weasel electronic warfare aircraft, and the A-10 air-to-ground attack aircraft.



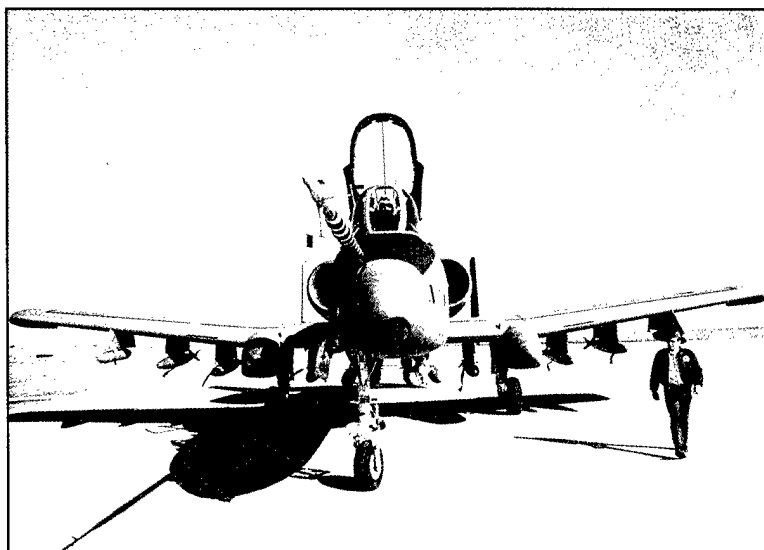
*Interior of AC-47 "Puff the Magic Dragon" gunship*



*AC-130 Spectre gunship*



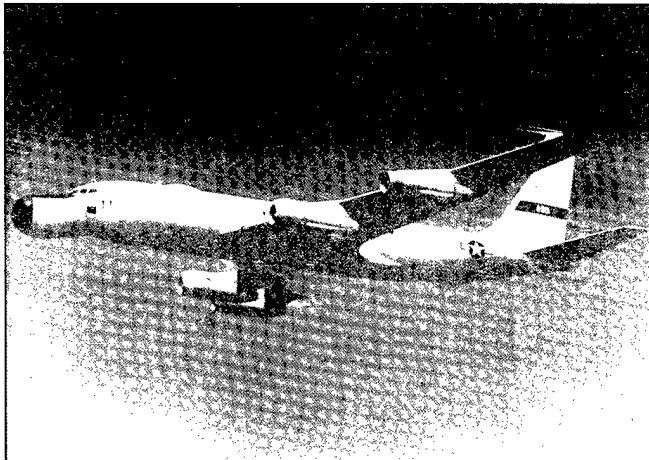
*F-4G Wild Weasel*



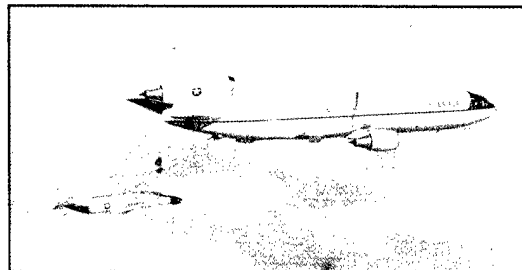
*Fairchild Republic A-10 Thunderbolt II*

In the early 1970s, the U.S. ended its involvement in Vietnam. Peace brought reductions in defense spending causing the Air Force to reorganize and consolidate its mission elements.

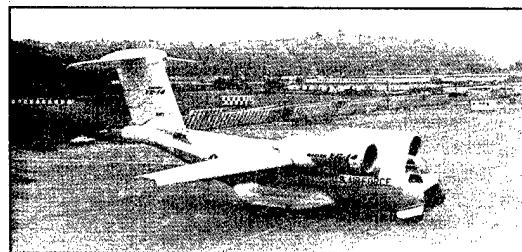
At Wright-Patterson, the Air Force created the 4950th Test Wing, which enlarged the mission and resources of ASD's flight test directorate. In mid-decade, the Air Force also consolidated the Wright Field laboratories under AFWAL. Meanwhile, ASD completed development and began acquisition of the F-15, F-16, and A-10 aircraft, and began acquisition of a new, more efficient tanker aircraft, the KC-10. ASD also underwrote prototype aircraft (YC-14 and YC-15) to explore the use of propulsion-lift technology for a new generation of airlift aircraft and the application of stealth technology (developed at Wright Field in the 1950s) to fighter and bomber aircraft.



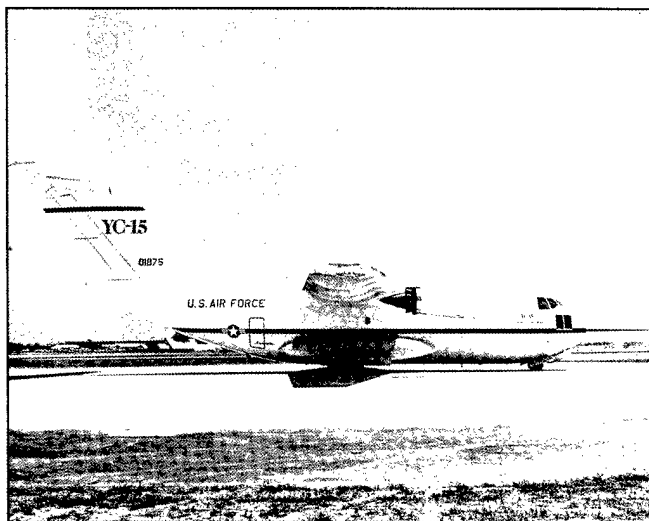
*4950th Test Wing's Advanced Range Instrumentation Aircraft (ARIA)*



*McDonnell Douglas KC-10A Extender*



*Boeing YC-14*



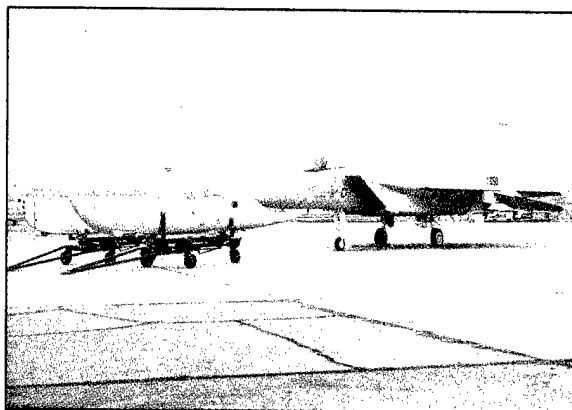
*McDonnell Douglas YC-15*



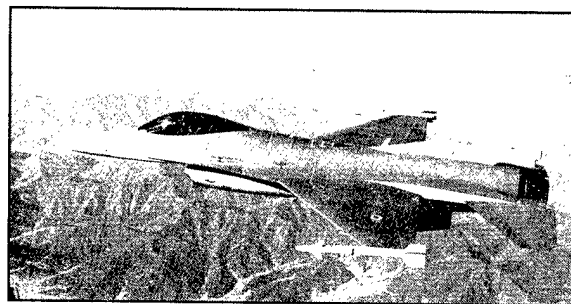
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Spending for defense began to increase, beginning in the late 1970s and continued through the mid 1980s. These increases allowed ASD to expand its development and acquisition of improved and new aeronautical systems. This included improvements in fighter aircraft, such as upgrades to the F-15 and F-16; completing development of the F-117 "stealth" fighter; and underwriting technologies for the next generation fighter aircraft, the Advanced Tactical Fighter (ATF). ASD also completed development and acquisition of the B-1 bomber and unveiled a revolutionary "flying-wing" bomber, the B-2. ASD also acquired an additional fifty C-5 heavy airlifters, designated the C-5B, and began development of an entirely new heavy airlift aircraft, the C-17. Finally, the ASD developed a number of special operations and special purpose aircraft, including the AC-130U gunship, the MC-130H Combat Talon II, the CV-22A Osprey tiltrotor aircraft, and two new Air Force One aircraft for the President of the United States.

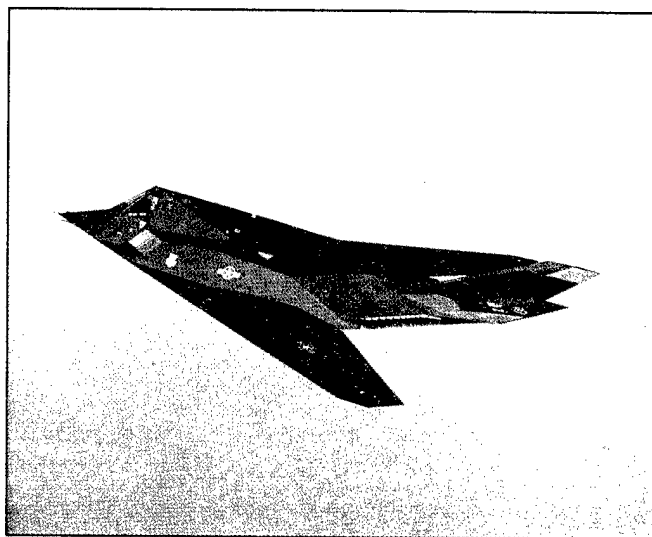
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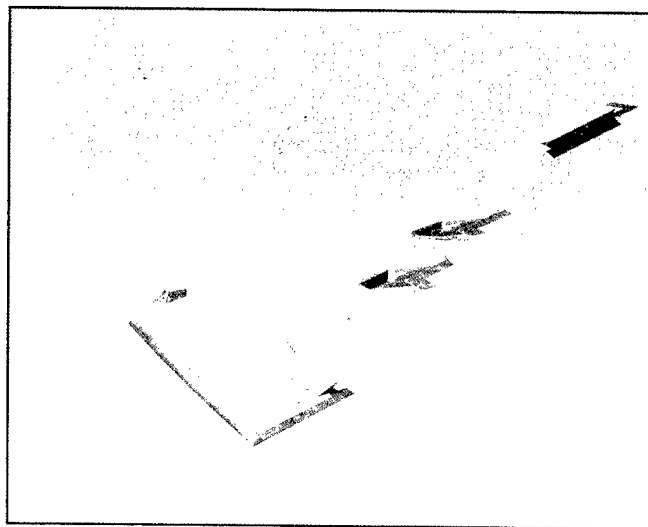
*Improvements to the F-15C included the capability to carry 2,000 pounds of additional internal fuel, and the addition of exterior conformal fuel tanks, increasing its takeoff weight to 68,000 pounds.*



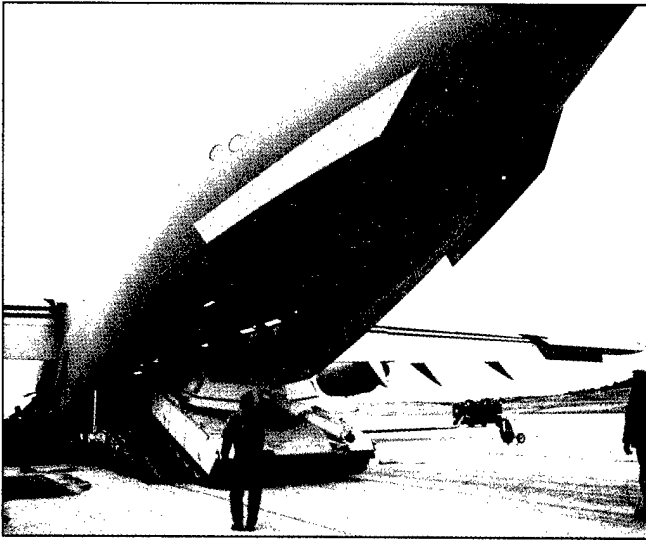
*The F-16C included built-in structural and wiring provisions and systems architecture that permitted expansion of the multirole flexibility to perform precision strike, night attack and beyond-visual-range interception missions.*



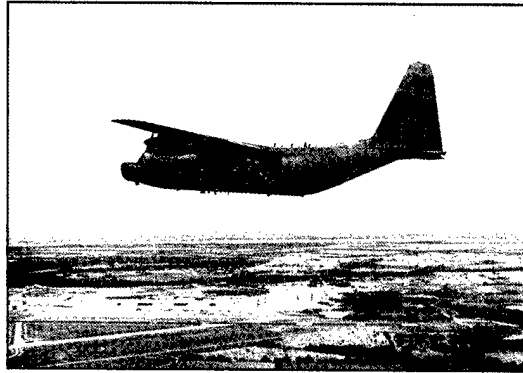
*Lockheed F-117A Nighthawk stealth fighter*



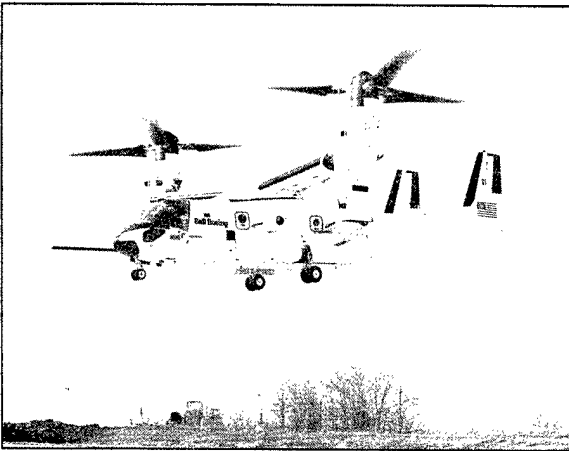
*Northrop B-2 Spirit multirole stealth bomber*



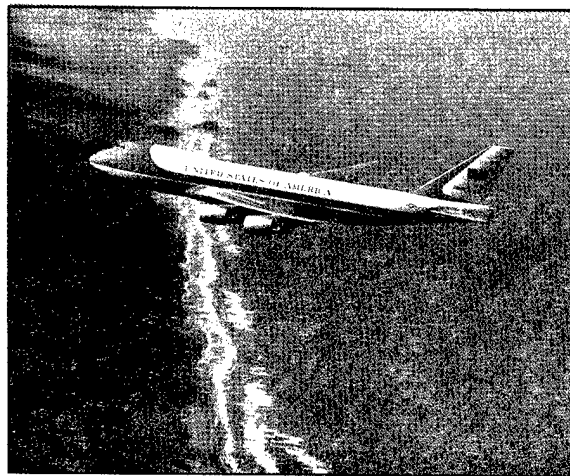
*McDonnell Douglas C-17A Globemaster III*



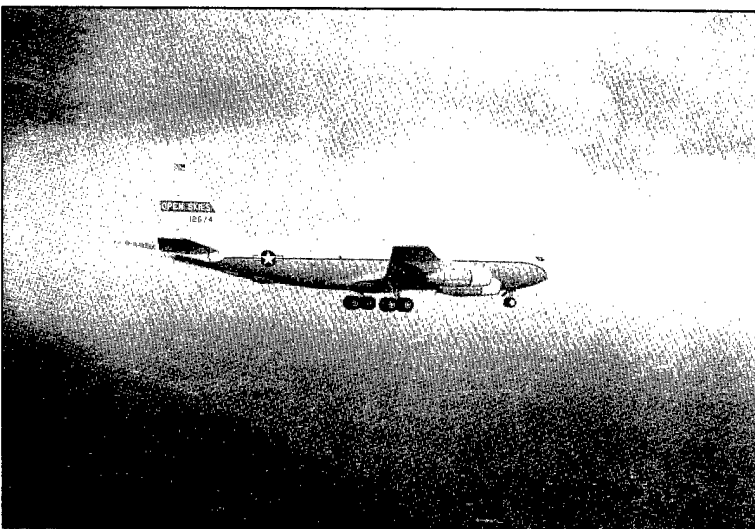
*The MC-130H Combat Talon II is used primarily for infiltration and exfiltration missions and to resupply ground special operations forces.*



*Bell Boeing CV-22A Osprey*



*Air Force One*

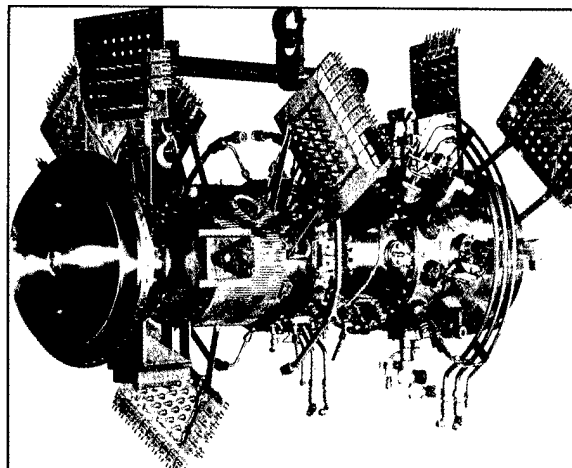


*The Open Skies Program modified a WC-135B to perform unarmed aerial observation of foreign military and industrial sites.*

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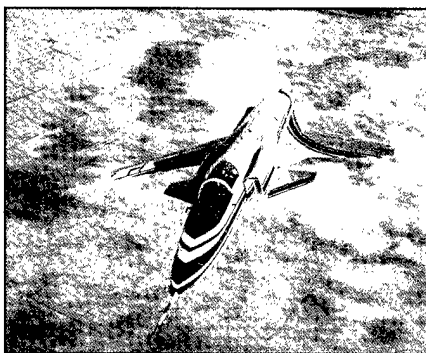
ASD's laboratories also fielded a number of advanced technology programs during the 1980s. In avionics, these included Pave Pillar avionics architecture; Integrated Communication, Navigation, and Identification Avionics (ICNIA); and Ultra Reliable Radar that incorporated an advanced Solid State Phased Array Radar, also developed during the decade. In propulsion, the laboratories spearheaded the Integrated High Performance Turbine Engine Technology (IHPTET) initiative, a major national effort to double turbine engine performance by the year 2000. This included the development of advanced high performance, durable materials. Materials development was also critical in the National Aero Space Plane (NASP) program that developed technologies for hypersonic flight. Meanwhile, in the area of flight dynamics ASD sponsored a number of technology demonstrator aircraft. These included the X-29, which flight tested forward swept wings for high-angle-of attack and other difficult maneuvers; the Advanced Fighter Technology Integration (AFTI)/F-111 that demonstrated the advantages of a variable camber wing in fighter aircraft performance; the AFTI/F-16 that tested advanced flight and fire control technologies; and the Short Takeoff and Landing (STOL)/F-15 that demonstrated several technologies, including thrust vectoring nozzles and improved landing gear for short runway operations.



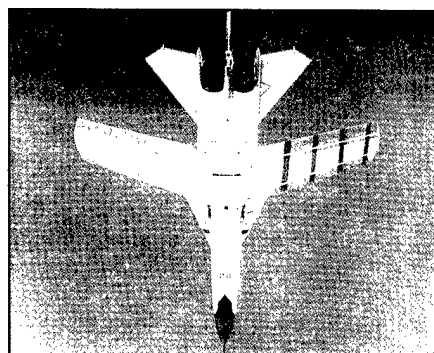
*The IHPTET initiative tested the Allison Expendable Turbine Engine Concept Demonstrator.*



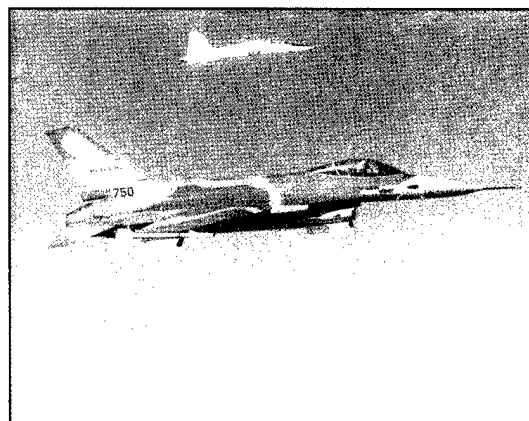
*Artist concept of the X-30 National Aero Space Plane*



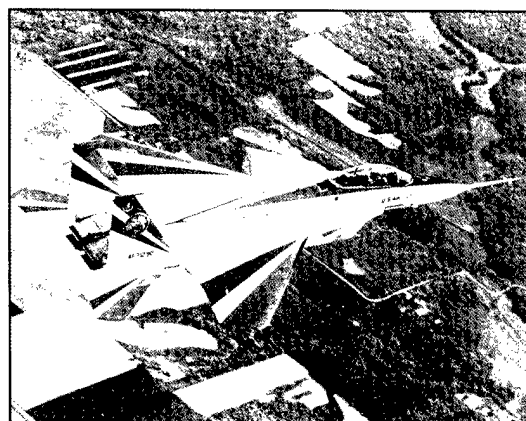
*Grumman X-29A*



*AFTI/F-111*



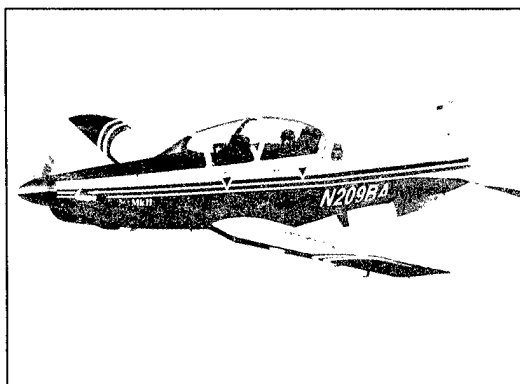
*AFTI/F-16*



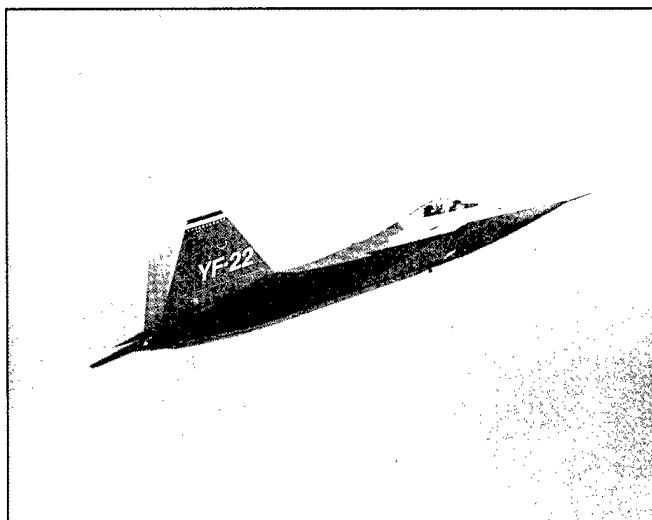
*STOL/F-15*



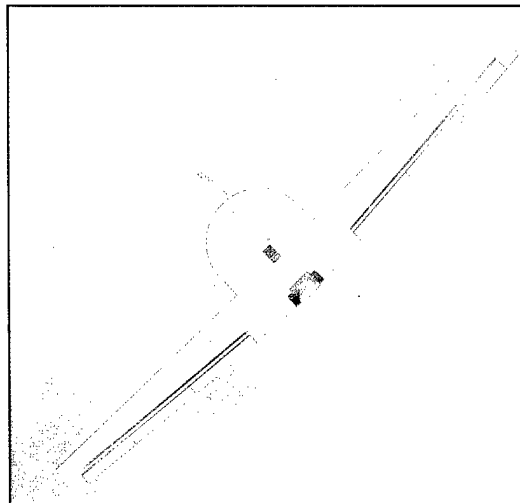
The Air Force's investment in these advanced systems and technologies paid off handsomely at the outset of the new decade in the 1990-1991 Persian Gulf War. Meanwhile, despite cutbacks in defense spending in the wake of the Cold War's end, ASD (later ASC) forged ahead with the acquisition of the C-17, the B-2, and development of the F-22 (formerly the ATF). At the same time, ASC broke ground in 1993 for the first new complex to house its acquisition corps in many years, the James H. Doolittle Acquisition Center.



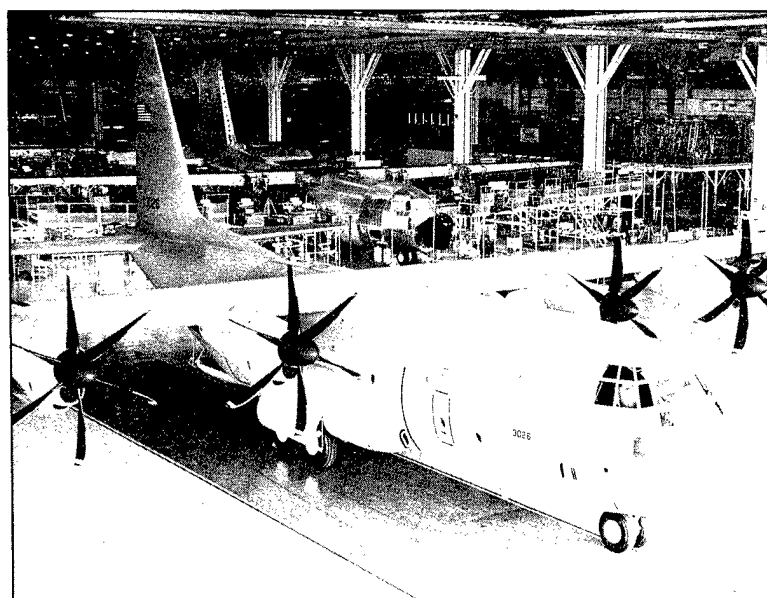
*The Beech Mk II was recently selected for the Joint Primary Aircraft Training System.*



*Lockheed YF-22 advanced tactical fighter*



*The Tier III Minus "Darkstar" unmanned aerial vehicle will replace manned aircraft for dangerous surveillance, targeting and bomb damage assessment missions.*



*The Lockheed Martin C-130J has six-bladed, all-composite propellers.*

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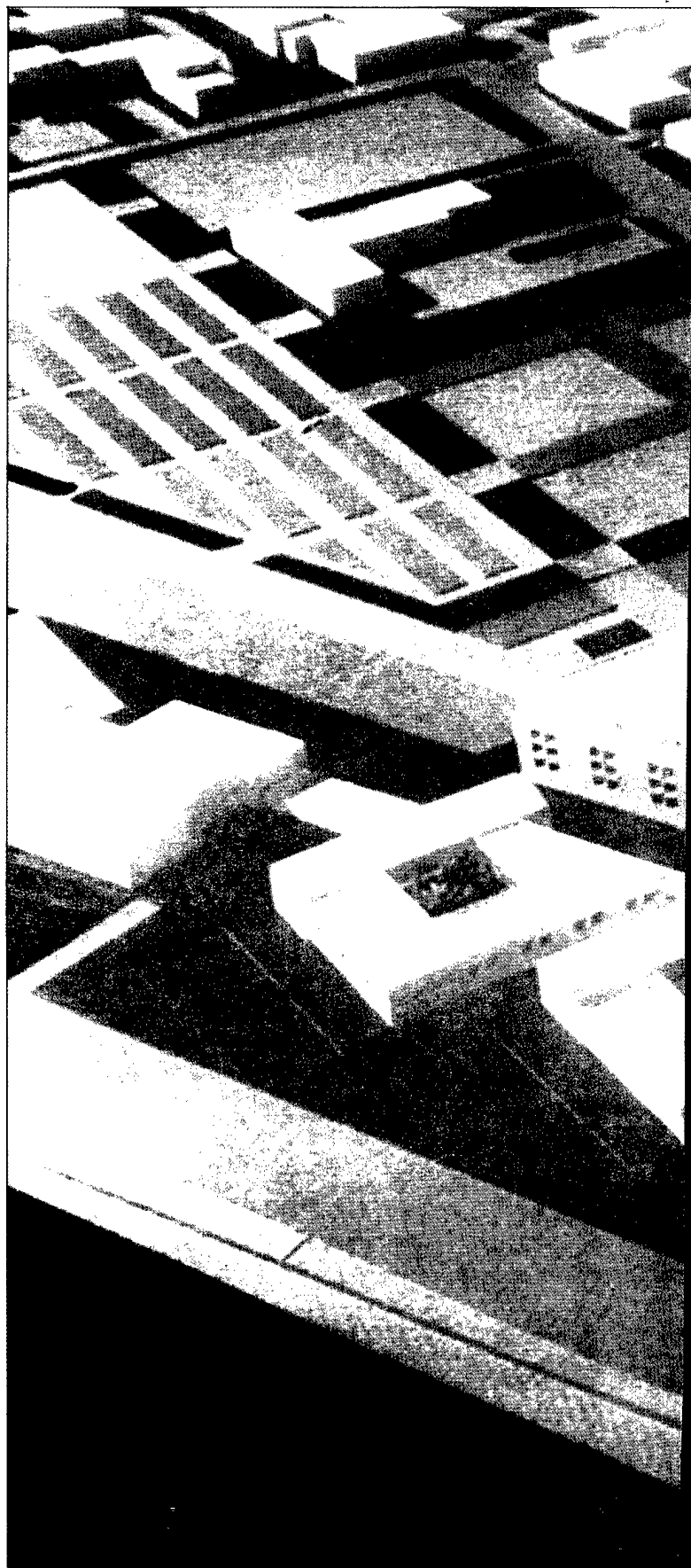
**F**or the past three and a half decades ASC has carried on the tradition begun at McCook and Wright Fields of developing and acquiring the most advanced aeronautical systems to maintain America's command of the air. This has been an investment in peace and prosperity that far exceeds the sums expended on aircraft and their related equipment.

Less obviously, perhaps, ASC and its predecessor organizations have also made direct contributions over the years to the civilian economy and America's competitive edge in world commerce. These contributions date all the way back to McCook Field, which experimented with crop dusting over agricultural acreage near Troy, Ohio, in the early 1920s. During the 1920s and 1930s the Air Corps sponsored development of

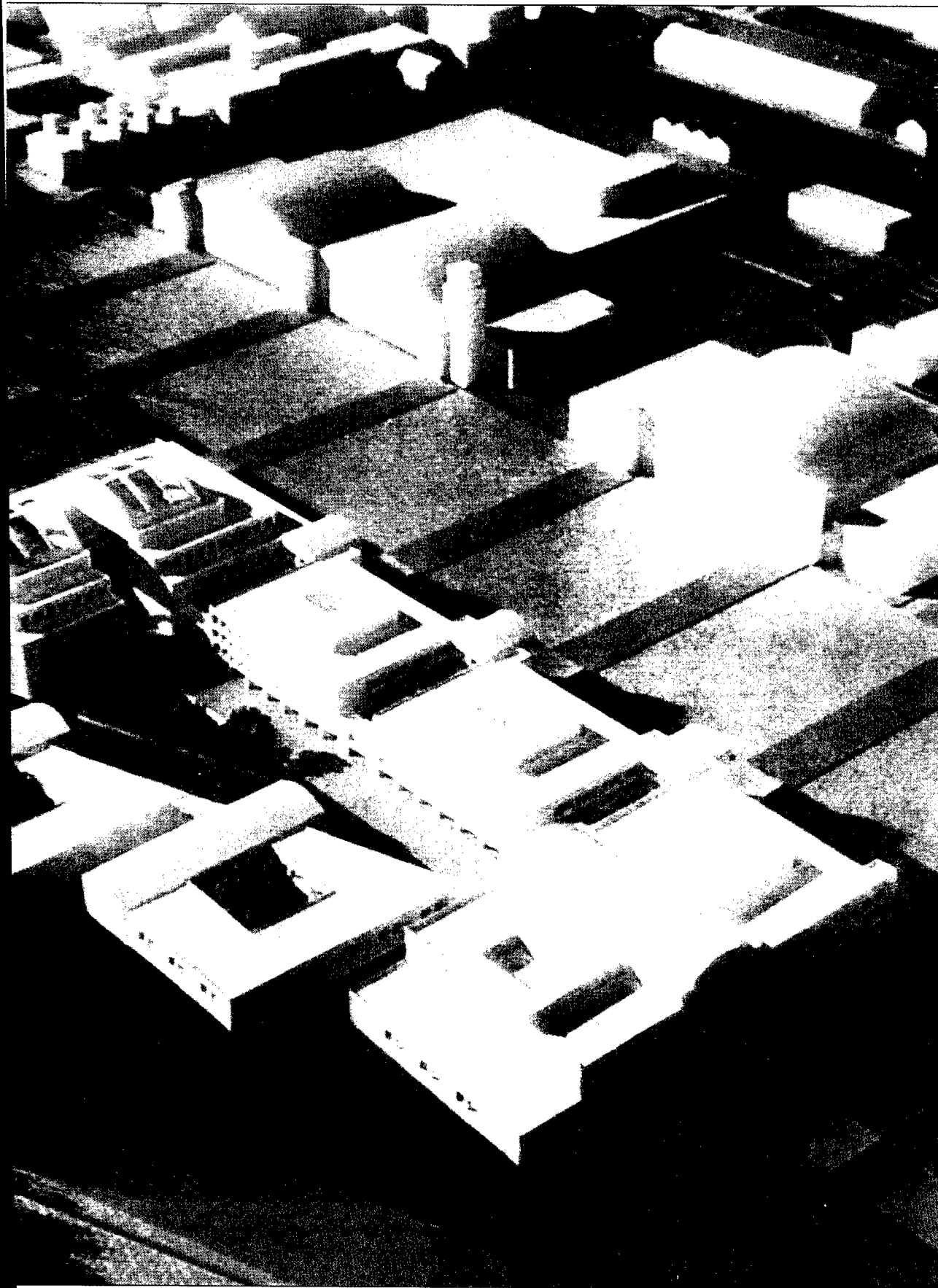
piston engines, advanced airframe designs, new fuels and lubricants, and assorted aeronautical equipment that made flight faster and safer, for both military personnel and civilians.

The Air Force's underwriting of jet engine technology and large bomber aircraft development following World War II accelerated the adoption of jet airliners by the commercial airlines and has made the U.S. the world's leader in gas turbine engine technology and sales. Likewise the Air Force has underwritten the development of advanced manufacturing equipment and practices and the development of microelectronics. Advanced materials, sponsored by the Air Force through the Wright Laboratory and its predecessor organizations have found a particularly wide application in the commercial sector.

As a new millennium approaches, ASC continues a safe investment for strength in war and prosperity in peace for the nation and the world.



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## HIGH FLIGHT

Oh, I have slipped the surly bonds of earth  
and danced the skies on laughter-silvered wings;  
Sunward I've climbed, and joined the tumbling mirth  
Of sun-split clouds - and done a hundred things  
You have not dreamed of - wheeled and soared and swung  
High in the sunlit silence. Hovering there,  
I've chased the shouting wind along, and flung  
My eager craft through footless halls of air.  
Up, up the long, delirious, burning blue  
I've topped the windswept heights with easy grace  
Where never lark, or even eagle flew.  
And, while with silent, lifting mind I've trod  
The high untrespassed sanctity of space,  
Put out my hand, and touched the face of God.

John Gillespie Magee Jr.

## REQUEST FOR EDITING AND PUBLISHING SUPPORT

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